Dysphagia
https://doi.org/10.1007/s00455-020-10218-8

REVIEW

Best Practice Recommendations for Stroke Patients with Dysphagia: A Delphi-Based Consensus Study of Experts in Turkey-Part II: Rehabilitation

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Received: 27 June 2020 / Accepted: 17 November 2020
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Abstract

Dysphagia is one of the most common and important complications of stroke. It is an independent marker of poor outcome following acute stroke and it continues to be effective for many years. This consensus-based guideline is not only a good address to clinical questions in practice for the clinical management of dysphagia including management, diagnosis, follow-up, and rehabilitation methods, but also includes detailed algorithms for these topics. The recommendation paper has been written by a multidisciplinary team and offers 117 recommendations for stroke patients with dysphagia. While focusing on management principles, diagnosis, and follow-up in the 1st part (45 items), rehabilitation details were evaluated in the 2nd part (72 items).

Keywords Dysphagia · Stroke · Recommendation · Delphi study · Rehabilitation

Introduction

Dysphagia is any disturbance in the swallowing process during bolus transport from the oral cavity to the stomach and it is one of the common complications of stroke [1].

Dysphagia at the time of admission is an independent marker for poor outcome following acute stroke and continues to be effective for many years [2]. Dysphagia may cause a number of problems, such as dehydration, malnutrition, aspiration pneumonia, and even death. Aspiration pneumonia is the most severe complication of dysphagia and occurs in about half of all patients with stroke during the first year; 40–70% of these aspirations are "silent" and the mortality rate is high [1].

There is a wide range of pathophysiological complications associated with dysphagia. Dysfunction related to the manifestation of dysphagia after stroke is consistently reported. In particular, complications in the pharyngeal phase of swallowing are quite common [3]. Furthermore, it has been reported that oral phase dysfunction has an effect on dysphagia and aspiration in stroke patients [4]. Therefore, it is important to define the oropharyngeal dysphagia (OD). Recent studies have shown that early diagnosis of OD is correlated with improved functional status, quality of life, and decreased mortality and morbidity in patients with stroke [5, 6].

Stroke management guidelines consider dysphagia as a mostly reversible complication of acute stroke and its detailed rehabilitation section is neglected. Because while medical specialists look at stroke from a wide medical perspective as stroke is a condition that includes many problems from cognitive problems to hemiplegia, dysphagia is a drop in this ocean. On the other hand, stroke patients may encounter any of the medical specialist in the emergency room or outpatient clinic. Therefore, it is important to be aware of the importance of dysphagia in all medical disciplines and to provide the necessary treatment at the appropriate time and

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Published online: 05 January 2021

effectively. There is no consensus-based recommendation paper that is multidisciplinary and offers detailed rehabilitation recommendations in our country and in the world.

Hence, recommendation paper aims to raise awareness and create a consensus of medical specialists for stroke patients with dysphagia as well as to respond to the problems and questions that we may encounter regarding dysphagia in clinical practice with a multidisciplinary approach from the perspective of experienced specialists.

Methods

This project was carried out by the *Turkish Society of Physical Medicine and Rehabilitation (PMR)-Dysphagia Working Group* between October 2019 and February 2020 with a 3-round Delphi survey via e-mail.

Purpose and Focus of Recommendations

For this recommendation document, dysphagia is defined as any difficulty during the passage of the bolus from mouth to esophagus [1].

A study specific to OD was primarily performed since OD is frequently observed in stroke patients and causes severe morbidity and mortality. No specific recommendations were done for esophageal dysphagia. Recommendations in this study were planned considering all patients with stroke and dysphagia, including acute, subacute, and chronic periods. For patients with stroke and dysphagia; rehabilitation method recommendations were created. The recommendations are structured in patients with stroke over 18 years old; therefore, they cannot be applied to patients under 18 years of age.

Methodology of Recommendation Development

The recommendations were created by a multidisciplinary expert group. Firstly, task force members were created by 4 experts from the working group, then consultant experts were selected [7, 8]. In the selection of consultant experts, it was required to be experienced in stroke patients. Additionally, experts who answered each questionnaire from their own perspective as a professional experienced in stroke patients were selected.

For the selection of this expert group members, an invitation has been sent by e-mail to 22 members of the dysphagia working group (PMR specialists) from 15 centers all over Turkey.

An invitation e-mail was sent to otolaryngology (10 person), geriatric medicine (5 person), neurology (10 person), gastroenterology (2 person), and internal medicine (3 person) specialists that experienced both in dysphagia and stroke patients from various geographic regions of Turkey, to create an agreed single view of our country with recommendations.

The 1st Delphi round of study started with 31 experts (20 PMR, 3 otolaryngology, 2 geriatric medicine, 4 neurology, 1 gastroenterology, and 1 internal medicine specialists) from 26 centers in 12 cities who responded to the invitation e-mail and agreed to participate. While 28 experts participated in the 2nd Delphi Round, the 3rd Delphi round of study was completed with 22 experts (14 PMR, 2 otolaryngology, 1 geriatric medicine, 4 neurology and 1 gastroenterology specialists).

The task force members developed the consensus recommendations by means of a seven-step process. *In the first step*, open-ended questions were created by four task force members (also writer group) under the main heading of rehabilitation (Fig. 1). As we started creating the questions, we first searched and identified the relevant published guidelines (NICE, SIGN, ESPEN, IASLT, WGO, AHA, SASLHA, CSBPR,…). After this initial review, we searched for the main Bibliographic Databases (Pubmed, EMBASE, and Cochrane Library) for recent systematic reviews and meta-analyses [9–39]. In case of their absence, we looked for other indirect systematic reviews and meta-analyses, randomized or nonrandomized comparative studies, respectively. In addition, an updated literature research was conducted to obtain further comparative studies. The screening was performed by reading the abstract, followed by the entire article when necessary. The literature review included the last 10 years until September 2019.

In the second step, 4 task force members reached consensus on 5 open-ended and unlimited comment questions, then the questions were sent to the consultant expert group members. The purpose of the 1st Delphi round was to determine rehabilitation modalities for dysphagia in stroke, to understand the problems, and to create the recommendations in Turkey. In this sense, the experts were asked to present their opinions and suggestions within a week.

In the third step, the task force group gathered the answers and additional suggestions of the experts and created 72 items for rehabilitation methods.

In the fourth step, the 2nd Delphi round was performed. The draft of the questionnaire containing the views of the majority was sent back to the consultant group and again the feedback of their views was expected within a week (the consultants were surveyed to assess their opinions on the feasibility of implementing the consensus).

In the fifth step, the questionnaire was revised, but the number of questions remained the same.

In the sixth step, the last version of the recommendations was shared with the consultant group with a 3rd Delphi round; they were asked to re-evaluate especially for

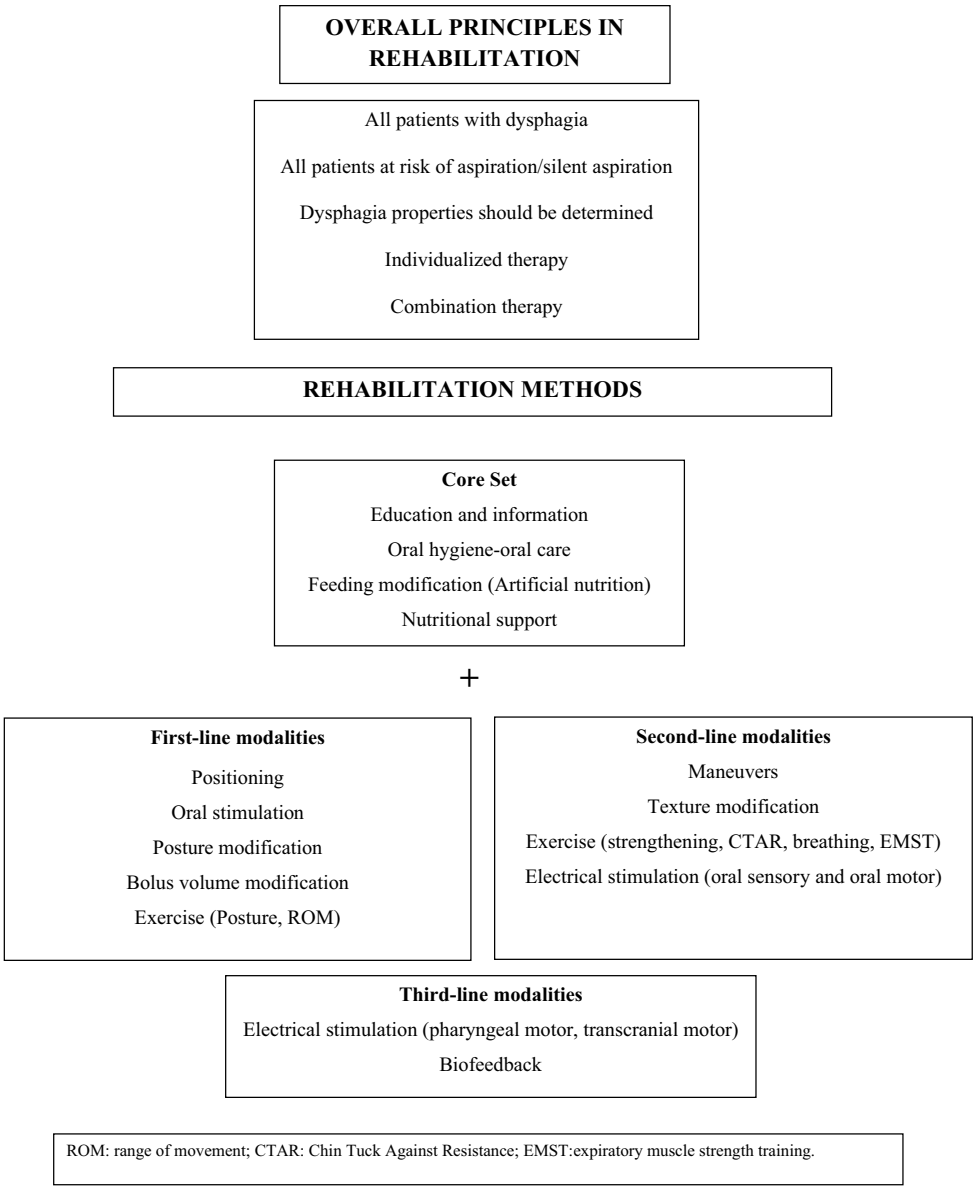

Fig. 1 A summary of the recommendations-II

questions close to compromise, but it was stated that the working group did not have to change the points.

In the *seventh step*, all available information was used to build consensus within the task force group to finalize the recommendations, while the 72 items containing the rehabilitation section were subdivided into overall principles in rehabilitation (6 items) and rehabilitation modalities including rehabilitation consisted of core set (16 items), first-line (14 items), second-line (20 items), third-line (6 items), and other (10 items) modalities.

Strength and Classification of Recommendations

All recommendations were rated by consultant expert group members with a 10-point scale (0–10): 0 point reflected "I totally disagree" and 10 reflected "I totally agree". This 10-point scale was divided into three terms indicating the strength of agreement in response to each statement. While many different methods were used to evaluate the strength of the recommendations in the literature, three measurements (percent (%), median value, and interquartile range (IQR)) were used to increase the strength of recommendations in respect of each of the items [40–42]. Strength of recommendations was classified as *overall consensus* (OC) (agreement rate in between 8 and 10 points is ≥ 80% and the median value is between 9 and 10 and IQR is ≤ 2), *approaching consensus (AC)* which means that there is no OC, but there is considerable support (agreement rate in between 8 and 10 points is 65–79% and the median value is between 8 and 10 and IQR is ≤ 3) , and *overall divergence (OD)* which means

there are significantly divergent views within group (agreement rate in between 8 and 10 points is < 65% or median value is < 8 or IQR is > 3). In the 1st and 2nd rounds of Delphi, the ODs were removed and the AC statements were revised by adding explanations and/or details.

In this study, "recommended and should" were used for OC (strong recommendation), “considered and may” were used for AC (weak recommendation), and “not recommended and should not” for overall divergence. “The highest level of agreement” (agreement rate is 100%, the median value is 10 and IQR is 0 point) expressed the “strong recommendation” in full sense of consensus.

Statistical Analysis

Descriptive statistics of SPSS version 22.0 (SPSS Inc., Chicago, IL, USA) software was used for statistical analysis. The strength of agreements (SOA) was calculated for each item and strong agreement was presented in proportions (response of 8–10%), median values, and IQR with Kappa method [43, 44].

Results

A questionnaire consisting of 72 items was prepared in line with the answers and suggestions of the expert group to 5 open-ended questions created by the task force group. While 76.4% of these items were accepted in accordance with the overall and approach consensus in the 2nd Delphi round, 77.8% of 72 items were accepted as compatible with the overall and approaching consensus in the 3rd Delphi round. The number of questions remained the same in each round. The recommendations consisting of 72 items are presented in Table 1, and the distributions of the strength of the recommendations in the 2nd and 3rd Delphi rounds are presented in Table 2.

There were 33 strong and 23 weak recommendations and 16 not recommended items in the rehabilitation section. Only 2 items had the highest level of agreement in the overall principles in the rehabilitation section.

Discussion

This study involves presenting the opinions and recommendations of experts from many regions of Turkey who have the knowledge and experience in “dysphagia and stroke” with a Delphi study. Experts’ opinions in accordance with the Delphi method were collected and analyzed to establish the degree to which there was consensus in stroke patients with dysphagia, in terms of rehabilitation methods. Seventy-two items (33 strong, 23 weak recommendations, and 16 not recommended) were created for the rehabilitation section. Only 2 items had the highest level of agreement (overall principles in rehabilitation section). All rehabilitation methods proposed by experts as response to the first open-ended questions were included in this study. Moreover, they were asked to specify the methods they use most frequently and/or most effectively (such as maneuver from masako maneuver) as detailed as possible. The methods determined as OC after Delphi rounds were included in this recommendation paper. In this study, different from other stroke management and treatment recommendation guidelines and firstly in the literature, a rehabilitation algorithm that includes a core set and the order of modalities was created to be useful in clinical practice.

1a. Overall principles in rehabilitation

Recommendation 1.a1: All stroke patients with dysphagia should be included in the rehabilitation program as soon as the diagnosis is established (OC).

Recommendation 1.a2: Patients who do not have dysphagia, but haverisk of aspiration should be included in a rehabilitation program that includes methods for preventing aspiration (OC).

Dysphagia is an indicator of mortality and morbidity in stroke patients, decreases the quality of life independently from other complications, and causes dysphagia-related complications such as malnutrition, dehydration, and aspiration pneumonia [45, 46]. Studies have been reported that dysphagia also affects socioeconomic status and increases hospital costs nearly twice [47]. Therefore, guidelines and meta-analyses are recommended that rehabilitation should be started as soon as possible and diagnosis is established [14, 25].

In our study, it was suggested that patients with dysphagia be included in the rehabilitation program. Moreover, unlike other recommendation papers, this study also suggests “a rehabilitation program should also be applied to patients at risk of aspiration/silent aspiration” as OC. However, with the recommendation of experts, it has been added as an explanation that passive (i.e., feeding route modification) or active (i.e., maneuvers) rehabilitation modalities may be within the definition of this rehabilitation program in order to prevent excessive or unnecessary use of rehabilitation methods.

Recommendation 1.a3: Dysphagia characteristics of the patient should be well defined at the beginning of rehabilitation (i.e., lack of tongue movements and presence of oral residue) (The highest level of agreement-OC).

Recommendation 1.a4: Before deciding on the rehabilitation program, the evaluation of the patient can be considered with instrumental methods (AC).

Since the purpose of the dysphagia rehabilitation program is to provide adequate nutrition with safe and effective

Table 1 Recommendations

1. Rehabilitation

1a. Overall principles in rehabilitation

1.a1. All stroke patients with dysphagia should be included in the rehabilitation program as soon as the diagnosis is established

Explanation: This program may include passive preventive and/or active rehabilitations

1.a2. Patients who do not have dysphagia but have risk of aspiration should be included in a rehabilitation program that includes methods for preventing aspiration

1.a3. Dysphagia characteristics of the patient should be well defined at the beginning of rehabilitation (i.e., lack of tongue movements and presence of oral residue) (The highest level of agreement)

1.a4. Before deciding on the rehabilitation program, the evaluation of the patient can be considered with instrumental methods

Explanation: The instrumental method can be selected according to the center and technical facilities

1.a5. Dysphagia rehabilitation program should be individualized for each patient

1.a6. Although the treatment of dysphagia in patients with stroke is individualized, it should be applied as a combination of methods (The highest level of agreement)

1b. Core set

1b.1 A core program set containing passive rehabilitation program may be considered for stroke patients with dysphagia

1b1a. *Education and information*: Rehabilitation program should be started with informing and educating the patient and family (Education and information should include the definition, complications and preventive methods of dysphagia)

1b1a1. Education and information is an effective method to reduce dysphagia complications

1b1b. *Oral hygiene and oral care* should be applied to every patient

1b1b1. Oral hygiene protocols can reduce the risk of pneumonia after stroke, as it is an effective method

1b1c. *Feeding route modification:* Providing safe and effective nutritional pathways (artificial nutrition) reduces mortality and morbidity due to dysphagia

1b1c1. Feeding route modifications should be applied in patients who have severe dysphagia and/or who have high risk for dysphagia and/or who have residue (> 25%) and aspiration (> 10%) with all volumes and all foods consistency

1b1c2. Patients who are predicted to have severe dysphagia for more than 7 days and/or who have a dysphagia risk should be fed with enteral tube feeding

Explanation: Patients with severe dysphagia and risk are those who are expected to take < 500 kcal for ≥ 3 days or < 60% of daily energy need for ≥ 5–7 days orally and safely

1b1c3. Enteral tube feeding method should be applied in patients who underwent mechanical ventilation, tracheostomy, and/or intubation in intensive care units and/or who with low cognitive functions, medical instability, and malnutrition or a history of malnutrition in the first 7 days

1b1c4. If the enteral tube feeding requirement is considered for 2 to 4 weeks in early period of stroke, nasogastric tube feeding should be applied as feeding method

1b1c5. In patients who are considered to be unable to be fed orally > 28 days, feeding with a percutaneous endoscopic gastrostomy (PEG) tube should be applied

1b1c6. PEG should be applied earlier in patients who cannot tolerate the nasogastric tube and/or who are not suitable for nasogastric tube and/or who deteriorate in dysphagia or develop aspiration during feeding via nasogastric tube

1b1c7. Intravenous (IV) supportive therapy may be considered for patients whose current dysphagia and/or dysphagia risk is predicted to not exceed 72 h

Explanation: The application should be short term

1b1c8. IV support can be added to oral nutrition to ensure hydration of patients with liquid aspiration

1b1d. Correction of nutritional status, supplementation of deficiencies, and implementation of nutritional rehabilitation by evaluating the risk of malnutrition reduce the risk of complications and is an effective method

1b2. Compensatory and therapeutic methods based on patient's defined dysphagia problem (dysphagia state and severity) should be added to the core program

1c. Rehabilitation Methods

1c1. First-line modalities

1c1a. Positioning is an effective method in dysphagia rehabilitation (Orally fed patients should be able to maintain a sitting position as much as possible, and non-oral enterally fed patients should be taken minimum 30° to 45° reclining position)

1c1a1. Positioning should be used as the first-line modality

1c1b. Oral sensory stimulation (thermal (cold)-tactile-pressure) is an effective method in dysphagia rehabilitation

1c1b1. Oral sensory stimulation should be used as the first-line modality

1c1c. Bolus volume modification is an effective method in dysphagia rehabilitation

Table 1 (continued)

1c1b1. Bolus volume modification can be considered as the first-line modality
1c1d. Exercises (non-specific, general) are effective methods in dysphagia rehabilitation
1c1d1. Exercises can be considered as the first-line modalities
1c1d2: Oropharyngeal range of motion (ROM) exercises can be effective
1c1d2a: Oropharyngeal ROM exercises can be considered as the first-line modalities
1c1d3: Head, neck and posture correction (cervical spine) exercises are effective
1c1d3a: Head, neck and posture correction exercises can be considered as the first-line modalities
1c1e. Posture modification is an effective method in dysphagia rehabilitation (e.g., chin tuck)
1c1e1. Posture modification should be used as the first-line modality
1c2. Second-line modalities
1c2a. Texture modification is an effective method in dysphagia rehabilitation
1c2a1. Texture modification should be used as the second-line modality
1c2a1a. The use of thickeners for liquid can be effective in dysphagia rehabilitation
1c2a1a1. The thickeners should be used as the second-line modalities
1c2b. Other exercises – Oropharyngeal strengthening, chin tuck against resistance (CTAR) exercise, breathing exercises (inspiratuar) and expiratory muscle strengthening exercises (EMST) can be effective in dysphagia
1c2b1. They can be considered as the second-line modalities
1c2c. Maneuvers are effective methods in dysphagia rehabilitation (e.g., Mendelson and Masako)
1c2c1. Maneuvers should be used as the second-line modalities
1c2d. Electrical stimulation (oral sensory and motor electrical stimulation) therapy is not an effective method in dysphagia rehabilitation
1c2d1. Electrical stimulation therapies can be considered as the second-line modalities
1d. Third-line modalities
1d1. Other electrical stimulation (motor pharyngeal and transcranial electrical stimulations) therapies are not an effective method in dysphagia rehabilitation
1d1a. Electrical stimulation therapies can be considered as the third-line modalities
1d2. Biofeedback is not an effective method in dysphagia rehabilitation
1d2a. Biofeedback can be considered as the third-line modality
1e. Other Modalities
1e1. Acupuncture is not an effective method in dysphagia rehabilitation
1e1a. Acupuncture cannot be a third-line modality
1e2. Kinesiotaping is not an effective method in dysphagia rehabilitation
1e2a. Kinesiotaping cannot be a third-line modality
1e3. Massage and mobilization are not effective methods in dysphagia rehabilitation
1e3a. Massage and mobilization cannot be third-line modalities
1e4. Drug therapy is not an effective method in dysphagia rehabilitation
1e4a. Drug therapy cannot be a third-line modality
1e5. Psychological support is not an effective method in dysphagia rehabilitation
1e5a. Psychological support cannot be a third-line modality

swallowing, the problem must be well defined before starting the treatment [48]. Almost all papers reported that the dysphagia characteristics should be identified with screening tests and detailed examination before the rehabilitation program [14, 19, 33, 35, 36, 49]. In stroke patients, the pharyngeal phase of swallowing is often affected, and aspiration findings such as a weak voice or cough or a wet hoarse quality after/during swallowing and need to clean the throat are observed. Less frequently, symptoms related to the oral phase disorder such as presence of oral residüe, drooling, and difficulty in lip closure, chewing, and tongue movements can be observed. Determining which phase of swallowing and which structure is affected allows individualization of the treatment. In our study, a good definition of dysphagia characteristics is accepted as a 100% agreement strong consensus. In addition to this evaluation, the guidelines also suggested that instrumental evaluation should be performed especially before the use of nutritional modification modalities as in our study [14, 19, 36, 39, 50–57]. The instrumental methods such as videofluoroscopy, modified barium radiography, and flexible fiberoptic endoscopy allow to observe severity and mechanism of swallowing impairment as well as to detect relationship between swallowing, food texture, and position. The use of these methods makes

Table 2 Distribution of the strength of the recommendations after 2nd and 3rd rounds

	2. Round			3. Round			SOA
	8–10%	IQR	Median	8–10%	IQR	Median	
1a. Overall Principles İn Rehabilitation							
1a1 All patients with dysphagia	92.85	0.83	9.89	90.90	0.43	10.00	OC
1a2 Patients at risk of aspiration	88.89	0.50	9.91	100	0.20	10.00	OC
1a3 Dysphagia properties	89.28	0.40	9.91	100	0.0	10.00	OC
1a4 Instrumental methods	77.78	2.24	9.83	77.27	2.00	9.00	AC
1a5 Individualized	96.29	0.19	9.93	90.90	0.80	10.00	OC
1a6 Combination therapy	92.85	0.20	9.92	100	0.0	10.00	OC
1b. Rehabilitation modalities							
1b1. Core set	74.07	2.25	9.87	80.95	2.00	8.00	AC
1b1a Education information	92.86	0.18	9.93	100	0.88	10.00	OC
1b1a1 Education information effectiveness	92.85	0.18	9.93	92.85	0.18	9.93	OC
1b1b Oral hygiene-oral care	92.86	0.40	9.91	100	0.43	10.00	OC
1b1b1 Oral hygiene effectiveness	88.89	1.07	9.57	81.81	1.18	10.00	OC
1b1c Feeding route modification	92.85	0.68	9.90	90.90	0.15	10.00	OC
1b1c1 Feeding modification criterias	81.48	1.18	9.40	95.23	0.43	10.00	OC
1b1c2 Enteral tube modification (> 7 days)	85.71	1.03	9.85	90.90	1.00	10.00	OC
1b1c3 Enteral tube modification (< 7 days)	88.89	0.85	9.88	95.45	0.20	10.00	OC
1b1c4 Nasogastric tube application	92.59	0.38	9.91	100	0.15	10.00	OC
1b1c5 Endoscopic gastrostomy application	92.60	1.10	9.87	95.23	0.20	10.00	OC
1b1c6 Endoscopic gastrostomy application-2	92.59	1.08	9.77	95.45	0.43	10.00	OC
1b1c7 Intravenous supportive therapy	76.00	2.35	9.53	70.00	2.50	9.00	AC
1b1c8 Intravenous supportive therapy-2	80.76	1.20	9.31	80.00	0.88	10.00	OC
1b1d Nutritional rehabilitation	96.29	0.61	9.78	90.90	1.00	10.00	OC
1b2 Core set + combination therapy	92.59	0.95	9.87	95.45	1.18	10.00	OC
1c1 First-line modalities							
1c1a Positioning effectiveness	95.83	0.85	9.75	95.23	0.15	10.00	OC
1c1a1 First-line for positioning	96.00	1.24	9.94	90.47	0.88	10.00	OC
1c1b Oral sensory stimulation effectiveness	69.23	2.67	9.00	86.92	2.00	9.50	AC/OC
1c1b1 First-line for oral sensory stimulation	80.00	2.35	9.00	92.85	2.13	9.50	AC/OC
1c1c Bolus volume modification effectiveness	100	0.75	9.77	95.00	1.13	10.00	OC
1c1c1 First-line for bolus volume modification	84.00	2.87	8.75	88.89	2.25	9.90	AC
1c1d General Exercise effectiveness	83.33	1.66	9.63	90.47	2.00	9.75	OC
1c1d1 First-line for general exercises	85.00	2.38	9.50	82.43	2.03	9.50	AC
1c1d2 Oropharngeal ROM exercise	77.20	2.66	9.54	80.95	2.25	8.50	AC
1c1d2a First-line for oropharyngeal ROM exercise	71.40	3.00	8.75	80.57	2.25	9.50	AC
1c1d3 Head, neck and posture correction exercise	82.60	1.62	9.52	85.71	1.00	10.00	OC
1c1d3a First-line for head, neck and posture correction exercise	75.00	2.50	9.50	87.50	2.10	9.75	AC
1c1e Posture modification effectiveness	87.5	1.25	9.88	90.47	0.60	10.00	OC
1c1e1 First-line for posture modification	76.7	2.30	8.50	85.71	1.75	9.50	AC/OC
1c2 Second-line modalities							
1c2a Texture modification	91.67	1.00	9.76	95.00	2.00	9.90	OC
1c2a1 Second-line for consistency modification	80.00	2.25	10.00	85	1.50	10.00	AC/OC
1c2a1a *Thickener*	83.33	2.04	9.25	76.19	2.38	9.00	AC
1c2a1a1 Second-line for thickener	70.80	2.50	8.25	85.00	1.63	10.00	AC/OC
1c2b Other exercises							
1c2b1 Oropharyngeal strengthening exercise	80.60	3.00	8.58	80.00	2.75	8.75	AC
1c2b1a Second-line for strengthening exercise	80.00	3.00	8.25	81.81	2.25	9.50	AC
1c2b2 CTAR exercise	72.71	2.75	8.25	72.70	2.55	9.57	AC

Table 2 (continued)

	2. Round			3. Round			SOA
	8–10%	IQR	Median	8–10%	IQR	Median	
1c2b2a Second-line for CTAR exercise	68.82	2.38	8.00	83.33	2.00	8.00	AC
1c2b3 Respiratory exercise	82.60	2.06	9.50	70.00	3.00	9.00	AC
1c2b3a Second-line for respiratory exercise	77.19	3.00	8.00	77.60	2.63	9.25	AC
1c2b4 EMST exercise	76.90	2.87	9.30	71.42	3.00	8.50	AC
1c2b4a Second-line for EMST exercise	71.40	3.00	8.00	84.61	2.50	9.75	AC
1c2c. Maneuver	81.8	1.83	9.64	90.47	1.00	10.00	OC
1c2c1. Second-line for maneuver	75.47	2.25	8.50	80.95	2.00	9.15	OC
1c2d General ES effectiveness	59.09	3.25	8.80	40.00	4.50	7.00	OD
1c2d1 Second-line for ES	67.90	3.00	8.85	85.00	2.15	9.00	AC
1c2d2 Oral sensory ES	50.00	3.20	7.50	55.00	2.25	7.50	OD
1c2d2a Second-line for oral sensory ES	68.42	2.25	8.00	88.89	2.13	9.00	AC
1c2d3 Oral motor ES	50.00	3.65	6.00	50.00	3.00	7.50	OD
1c2d3a Second-line for oral motor ES	74.50	3.00	9.00	75.00	2.75	10.00	AC
1c3 Third-line modalities							
1c3a Other electrical stimulation							
1c3a1 Pharyngeal motor ES effectiveness	55.00	3.85	8.50	68.18		8.62	OD
1c3a1a Third-line for pharyngeal motor ES	73.68	3.00	8.80	78.81		9.00	AC
1c3a2 Transcranial motor ES effectiveness	25.00	3.01	5.00	42.85		7.16	OD
1c3a2a Third-line for transcranial motor ES	68.00	2.85	8.50	77.30		8.25	AC
1c3b Biofeedback effectiveness	59.09	3.45	6.25	60.30	3.25	6.85	OD
1c3b1. Third-line for biofeedback	65.50	3.80	7.20	68.81	2.70	8.50	OD/AC
1c4 Other modalities							
1c4a Acupuncture effectiveness	10.00	5.37	5.00	23.80	4.00	5.10	OD
1c4a1 Third-line for acupuncture	55.00	5.35	6.50	77.30	4.80	7.50	OD
1c4a2 Kinesiotaping effectiveness	25.00	2.75	5.00	36.36	5.00	5.75	OD
1c4a2a Third-line for kinesiotaping	55.00	5.00	6.00	63.60	4.80	6.50	OD
1c4a2b Massage mobilization effectiveness	15.00	3.75	5.00	23.80	3.25	6.08	OD
1c4a2b1 Third-line for massage-mobilization	42.90	4.25	7.50	50.00	4.50	7.00	OD
1c4a2c Drug therapy effectiveness	45.00	5.25	5.50	55.00	5.75	5.00	OD
1c4a2c1 Third-line for medicines	39.52	3.83	4.00	40.83	2.25	6.08	OD
1c4a2d Psychological support effectiveness	50.00	4.25	7.00	73.90	4.05	7.50	OD
1c4a2d1 Third-line for psychological support	52.80	3.50	8.00	54.50	2.13	8.00	OD

IQR interquartile range, *SOA* strength of agreement, *AC* approaching consensus, *OC* overall consensus, *OD* overall divergence, *ROM* range of movement, *CTAR* chin tuck against resistance, *EMST* expiratory muscle strength training, *ES* electrical stimulation

possible to determine residue, penetration, and aspiration with various foods and to observe function of swallowing structure such as oral cavity, pharynx, larynx, and vocal cords [1, 58]. However, special equipment and trained personnel are required for instrumental methods and they may not be available everywhere. Hence, the explanation "the instrumental method can be selected according to the center and technical facilities" has been added and accepted at the weak recommendation level.

Recommendation 1.a5: Dysphagia rehabilitation program should be individualized for each patient (OC).

Recommendation 1.a6: Although the treatment of dysphagia in patients with stroke is individualized, it should be applied as a combination of methods (The highest level of agreement-OC).

Swallowing is a complex behavior. When minor anomalies are taken into account in stroke patients, various levels of dysphagia can be seen in almost all stroke patients. This means that many different symptoms and signs from mild to severe can occur in patients. Therefore, identification of people with dysphagia, determining problems in oropharyngeal anatomy and physiology, setting specific goals for patients, and making individualized rehabilitation plans will provide the most effective dysphagia management. Studies are suggested that dysphagia rehabilitation should be personalized and they reported that combination therapies based on the

patient's symptoms and findings will be more effective than a single modality [13, 14, 19, 23, 49, 59–62]. In this study, it has been accepted with a 100% agreement that personalized and combination therapy should be applied.

1b. Core Set

Recommendation 1b.1: A core set containing passive rehabilitation program may be considered for stroke patients with dysphagia (AC).

Since the articles addressing the deficiencies in dysphagia management have reported that a core set is needed and there is still no algorithm on the treatment protocols [63–65], a core set that can be applied to all patients was created in this study.

The early stages of stroke include many problems that need to be treated primarily, such as medical instability and cognitive damage. During this period, while conditions that threaten the patient's life are treated, dysphagia often remains in the background. This condition can cause aspiration pneumonia or nutritional deficiency or even death [66]. We think that a core set that includes a passive rehabilitation program should be applied to all patients while treating other medical problems, even if the patient does not participate cognitively, which will prevent dysphagia complications. Therefore, a core set was created by our experts. This core set consists of education and information, oral hygiene-oral care, feeding route modification, and nutritional support. In Delphi rounds, this core set has been suggested as a weak recommendation due to the concern that it may cause unnecessary applications. With this concern, oral thermal and tactile stimulation applications in the core set during the 1st Delphi round have been removed in the 2nd and 3rd Delphi rounds. We think that these 4 methods in the core set will be applied in accordance with the personal needs and the necessity of the modalities.

Recommendation 1b1a: Education and information: Rehabilitation program should be started with informing and educating the patient and family (Education and information should include the definition, complications and preventive methods of dysphagia) (OC).

Recommendation 1b1a1: Education and information is an effective method to reduce dysphagia complications (OC).

Dysphagia not only causes medical problems in stroke patients but also causes psychosocial problems affecting the quality of life such as depression, anxiety, fear of eating and chocking, and social isolation. These problems can affect patient compliance to treatment. Studies have reported that patient compliance has a major impact on the effectiveness of treatment [67–69]. Moreover, it also affects the caregivers or relatives of the patients. It has been reported that there are disconnections between their expectations and difficulties they experienced in the daily lives of patients' relatives [70–72]. Patients who are educated about their illnesses have more social communication and less depression. Moreover, education and information added to the conventional rehabilitation program about complications, severity of disease, and precautions to be taken have shown that it both facilitates the patient's acceptance of the disease and increases communication with the caregiver [25]. This paper suggested that patients and their relatives should be included in the dysphagia management team and management should be patient centered. In accordance with this recommendation, it is accepted as a OC that the education and information for all patients should be included in the dysphagia core set program as a rehabilitation modality.

Recommendation 1b1b: Oral hygiene and oral care should be applied to every patient (OC).

Recommendation 1b1b1: Oral hygiene protocols can reduce the risk of pneumonia after stroke, as an effective method (OC).

There are over 400 types of bacteria in the mouth. While poor oral care, dental infection and dental plaques negatively affect swallowing due to chewing and sensory desensitization, and dry mouth facilitates bacterial colonization [73–76]. Moreover, chronic and/or large-volume aspiration of oropharyngeal bacteria can cause lung damage and aspiration-induced pneumonia in patients with poor oral hygiene and dysphagia. The lack of host defense mechanisms such as coughing, active ciliary clearance, and humoral and cellular immunity increases the risk of lung diseases in stroke patients. Guidelines and meta-analyses have been reported that oral hygiene protocols can reduce the development of aspiration-induced pneumonia and medications including oral flora bacteria can be used in the treatment of this pneumonia as well as screening tests should not be performed and oral feeding should not be initiated without providing oral hygiene [13, 19, 23, 25, 61, 75, 76]. This study suggested that adequate oral hygiene and oral care can reduce the risk of dysphagia-related pneumonia and this method is recommended for all patients.

Recommendation 1b1c: Feeding route modification: Providing safe and effective nutritional pathways (artificial nutrition) reduces mortality and morbidity due to dysphagia (OC).

There is tube feeding requirement in 8–34% of acute period stroke patients and this rate is 8% in the chronic period [37, 52]. While decreased level of consciousness, severe dysphagia, or severe plegia of patients may cause decrease food intake and increase metabolic instability in the early period, these problems may reduce functional independence and lead to increased mortality in the chronic period [14, 50, 52]. In other words, safe and effective feeding route modification is a necessary treatment method for every period of stroke. Guidelines have been reported that nutritional rehabilitation should be part of stroke management

[14, 33–36, 50, 77]. Our experts decided that feeding route modification should be a part of the core set to expect reduction in mortality and morbidity. However, it is reported that feeding tube use may cause an increase in mortality compared to normal swallowing [78, 79]. Hence, the application rules of feeding route modification are detailed in order to prevent overuse and possible complications as follows:

Recommendation 1b1c1: Feeding route modifications should be applied in patients who have severe dysphagia and/or who have high risk for dysphagia and/or who have residue (> 25%) and aspiration (> 10%) with all volumes and all foods consistency (OC).

Recommendation 1b1c2: Patients who are predicted to have severe dysphagia for more than 7 days and/or who have a dysphagia risk should be fed with enteral tube feeding (OC).

Explanation: Patients with severe dysphagia and risk are those who are expected to take or take < 500 kcal for ≥ 3 days or < 60% of daily energy need for ≥ 5–7 days as orally and safely.

Recommendation 1b1c3: Enteral tube feeding method should be applied in patients who underwent mechanical ventilation, tracheostomy, and/or intubation in intensive care units and/or with low cognitive functions, medical instability, malnutrition, or a history of malnutrition in the first 7 days (OC).

A high catabolic process and hemodynamic instability occur in the first 2 days after brain injury such as stroke and significant muscle loss forms between 3 and 7 days [53, 58]. Therefore, nutritional rehabilitation should be initiated as soon as possible by calculating calorie and energy needs [14, 15, 51, 53–58]. The guidelines have proposed some criteria for the application time of feeding route modification, one of the nutritional rehabilitation methods. Early feeding route modification is recommended at mild-moderate level of evidence for patients with low-level consciousness, who had severe motor plegia, mechanical ventilation and severe dysphagia as well as expected that cannot be fed orally for more than 7 days [10, 14, 33, 34, 36, 38, 50, 52]. We also suggested the use of feeding route modification application criteria as an OC, similar to the guidelines.

Recommendation 1b1c4: If the enteral tube feeding requirement is considered for 2 to 4 weeks in early period of stroke, nasogastric tube feeding (NGT) should be applied as feeding method (OC).

Recommendation 1b1c5: In patients who are considered to be unable to be fed orally > 28 days, feeding with a percutaneous endoscopic gastrostomy (PEG) tube should be applied (OC).

Recommendation 1b1c6: PEG should be applied earlier in patients who cannot tolerate the nasogastric tube and/or who not suitable for NGT and/or who deteriorate in dysphagia or develop aspiration during feeding via NGT(OC).

Percutaneous endoscopic gastrostomy (PEG) and NGT feeding as feeding route modification are widely used for delivering enteral nutrition [80–83]. Nutritional management guidelines recommend the use of NGT for short-term enteral nutrition in the acute period and PEG for long-term nutrition over 28 days as a strong consensus [14, 22, 25, 33–36, 50]. Although general recommendations are like this, early application of PEG for patients who cannot tolerate and/or cannot apply NG and who remain in mechanical ventilation for more than 2 days, is suggested at the mid-level recommendation and expert opinion. In this paper, NGT is recommended for short-term use and PEG for long-term use as a strong level recommendation.

Recommendation 1b1c7: Intravenous (IV) supportive therapy may be considered for patients whose current dysphagia and/or dysphagia risk is predicted to not exceed 72 h (AC).

Recommendation 1b1c8: IV support can be added to oral nutrition to ensure hydration of patients with liquid aspiration (OC).

Guidelines recommend switching to enteral feeding as soon as possible in patients who cannot feed orally for the purpose of reducing the risk of bacterial translocation and infection [14, 50, 79]. Parenteral nutrition recommendations remained at the level of expert opinion due to the risk of bacterial traslocation. Similarly, there were opinion divergence among the experts in terms of application IV support in this study. Finally, short-term IV support in patients who will return to oral administration for a period not exceeding 72 h is accepted as AC. On the other hand, parenteral hydration application in order to support enteral nutrition has been suggested as a strong consensus. Because the adequate fluid is critical for healing and general well-being for a number of basic functions, including homeostasis, waste elimination, perfusion preservation, and thermoregulation [25]. Although there are not enough recommendation about parenteral hydration application in the literature, some guidelines have suggested at low-level recommendation that parenteral hydration support can be applied patients cannot provide adequate hydration through oral or enteral feeding in order to prevent possible complications of dehydration until the patient is safely swallowed with close follow-up [14, 36, 50].

Recommendation 1b1d: Correction of nutritional status, supplementation of deficiencies and implementation of nutritional rehabilitation by evaluating the risk of malnutrition reduce the risk of complications and is an effective method (OC).

Apart from dysphagia, many problems such as cognitive dysfunction, lack of feeding ability due to palsy, communication and visual problems, and mood disorders negatively affect nutritional status after stroke. Moreover, nutritional deficiency can lead to an increased risk of infection, pressure sores, and functional dependence by suppressing the immune

system in stroke patients. That is, nutritional rehabilitation should be a part of dysphagia treatment. Although there are few studies showing the positive effect of nutritional rehabilitation on clinical gain in stroke patients in the literature, some guidelines have been reported that nutritional status is associated with increased mortality and poor outcome, and nutritional rehabilitation should be part of stroke management [14, 50, 79, 84, 85]. In our study, the recommendation that nutritional rehabilitation should be a part of dysphagia management was suggested as a strong consensus.

Recommendation 1b2: Compensatory and therapeutic methods based on patient's defined dysphagia problem (dysphagia state and severity) should be added to the core program (OC).

Restorative and rehabilitative methods such as exercise are effective to increase strength, speed and timing of swallowing in the long term. On the other hand, compensatory techniques are often effective for the short term and do not provide functional changes in the long term [25, 59, 60]. Currently, there is no single treatment method or rehabilitation modalities to be used in the treatment of dysphagia. Therefore, the combination of these modalities that selected according to the characteristics of dysphagia, will provide a systematic and continuous treatment for both short- and long-term rehabilitation. Our experts recommend adding other modalities to the core program.

1c. Rehabilitation Methods

Treatment methods are described as the first, second, and third-line methods except core set.

The first-line modalities have been shown to be effective in the treatment of dysphagia and should be considered as first.

Second-line modalities are those that still hesitate about their effectiveness in the treatment of dysphagia, but their inclusion is believed to benefit the patient.

Third-line modalities are methods that do not have sufficient information about their effectiveness in dysphagia treatment and can be considered in case of inadequacy of first- and second-line methods.

Finally, methods that are not included in these categories are defined as other modalities.

1c1: First-Line Modalities

Recommendation 1c1a: Positioning is an effective method in dysphagia rehabilitation (Orally fed patients should be able to maintain a sitting position as much as possible, and non-oral enterally fed patients should be taken minimum 30°-45° reclining position) (OC).

Recommendation 1c1a1: Positioning should be used as the first-line modality (OC).

Reclining position ensures the front of the oral cavity is raised and the back is lowered. This position facilitates the flow of the bolus from the mouth to the pharynx with the force of gravity as well as provides protection of the respiratory tract due to the respiratory tract is raised and the esophagus is lowered [86]. In particular, it is recommended to maintain this position with an angle of at least 30° to 45° to prevent the risk of enteral tube aspiration [86–88]. The 45° angle has been shown to reduce residue, penetration, and aspiration [87, 88]. Although, in a review study conducted in recent years, it is reported that there are no high-quality studies and their effectiveness is insufficient [89], some guidelines and bedside screening tests have been reported that the ability to remain the sitting position is a prerequisite for the initiation of oral intake [13, 20, 90]. Positioning is considered a non-invasive, simple but effective method that can be applied to the patient. Therefore, this study recommended that positioning the patient is effective in the treatment of dysphagia to prevent aspiration.

Recommendation 1c1b: Oral sensory stimulation (thermal (cold)-tactile-pressure) is an effective method in dysphagia rehabilitation (OC).

Recommendation 1c1b1: Oral sensory stimulation should be used as the first-line modality (OC).

The normal process of swallowing includes the oral preparatory phase in which food is chewed; the oral phase in which food is moved to the rear of the oral cavity as well as the pharyngeal phase where the bolus passes into the esophagus by triggering swallowing. Sensory input is vital for effective swallowing function and it is via receptors [91]. Oral mucosa, submucosa, and muscles contain the pressure and touch-sensitive mechanoreceptors, taste-sensitive chemoreceptors, stretching, pain, and heat-sensitive receptors. Therefore, the oral region has an important place in dysphagia management. It has been reported that cold stimulation applied to frontal palatine arches is effective on a delay of cough and swallowing reflexes and decreases the risk of aspiration. Also, it has been shown that applying pressure to the tongue with a spoon, touching the face and giving various viscous foods such as nectar and honey affect the sensory-perceptual separation threshold [62, 92–95]. In this study, apart from cold application with the highest level of evidence in the literature, no elaboration has been made. Also, in this article, whether or not oral stimulation is in core set is discussed and is recommended as the first-line treatment due to lack of standard practice.

Recommendation 5c1c: Bolus volume modification is an effective method in dysphagia rehabilitation (OC).

Recommendation 1c1b1: Bolus volume modification can be considered as the first-line modality (AC).

Although bolus volume modifications have been reported to reduce the incidence of aspiration pneumonia, there is insufficient evidence for its effect on mortality [14, 50].

Moreover, long-term bolus volume modification has been reported to reduce fluid intake and disrupt hydration [14, 96]. Our experts have reported that bolus volume modification can be used as an effective method, but they have created weak-level recommendation as the first-line method due to possible side effects in the long term.

Recommendation 1c1d: Exercises (non-spesific, general) are effective methods in dysphagia rehabilitation (OC).

Recommendation 1c1d1: Exercises can be considered as the first-line modalities (AC).

Recommendation 1c1d2: Oropharyngeal range of motion (ROM) exercises can be effective (AC).

Recommendation 1c1d2a: Oropharyngeal ROM exercises can be considered as the first-line modalities (AC).

Recommendation 1c1d3: Head, neck and posture correction (cervical spine) exercises are effective (OC).

Recommendation 1c1d3a: Head, neck and posture correction exercises can be considered as the first-line modalities (AC).

Exercise is a treatment method used in dysphagia for a long time [59]. Exercises used in the treatment of dysphagia are rehabilitation modalities aimed to change and to improve swallowing physiology as well as to induce neuroplasticity in neuromuscular systems. There are papers reporting that exercise-based treatments are effective in dysphagia compared to compensatory methods [65, 97]. In this study, besides the general view of the experts on the exercises, their suggestions on the types of exercises in detail were evaluated and experts noted that exercise is an effective method in general as OC. In particular, head, neck, and posture correction exercises are recommended as these exercises will be effective in maintaining the correct position for oral intake [97]. However, the recommendation on the oropharyngeal ROM exercises is at a weak level. Oropharyngeal ROM exercises are often used in patients with head and neck cancer in the treatment of dysphagia. It is effective in the treatment of dysphagia in these patients because of surgery and radiotherapy reduce oropharyngeal ROM [98]. There are no studies reporting its effectiveness in patients with stroke dysphagia. Mechanisms that require active and sufficient ROM such as opening and closing the mouth and chewing should properly work for an effective swallowing function. For these reasons, it was thought that ROM exercises should also be used in the treatment of dysphagia in stroke patients and was added to the recommendations. However, there was a weak recommendation about the exercises is the first-line treatment method. The reason for this is the idea that exercises require the active participation of patients and many patients' characteristics such as age, cognitive disfunction, comorbidities, stroke severity and exercise intolerability can affect exercise application. Moreover, there is no standardization in exercise features such as the intensity, frequency, repetition number, and duration. For this reason, it has been reported that it can be tried as the first-line treatment method.

Recommendation 1c1e: Posture modification is an effective method in dysphagia rehabilitation (e.g., chin tuck) (OC).

Recommendation 1c1e1: Posture modification should be used as the first-line modality (OC)

Posture modifications are compensatory methods used to prevent early escape and aspiration in stroke patients. Postures were defined as a repositioning of the head and/or neck before the onset of the pharyngeal phase of the swallow to maintain the safe position until the swallow was completed. In particular, the chin tuck technique has been shown to reduce the risk of aspiration by 50% [99]. Although it has been reported to be effective in a few studies, there are no high-quality studies demonstrating its effectiveness as well as there are not enough studies on other posture modifications [89]. Although there is insufficient evidence-based evidence, since this is a consensus-based recommendation article, our experts suggested that the chin tuck method, which is easily implemented by the patient and is the most recommended modification type [14] is recommended to eligible patients.

5c2. Second-Line Modalities

Recommendation 1c2a: Texture modification is an effective method in dysphagia rehabilitation (OC).

Recommendation 1c2a1: Texture modification should be used as the second-line modality (OC).

Recommendation 1c2a1a: The use of thickeners for liquid can be effective in dysphagia rehabilitation (AC).

Recommendation 1c2a1a1: The thickeners should be used as the second-line modalities (OC).

Texture modifications and thickeners are used to prevent the risk of aspiration. Although some guidelines have been reported that texture and consistency modification may reduce aspiration, the number of quality studies is insufficient and suggestions have been made at mid-level and expert opinion [14, 50]. On the other hand, long-term use of texture modification causes energy and protein deficiency due to single and limited consistency, and decreased quality of life [14, 50, 100, 101]. Moreover, depending on the type of thickeners, it may increase the risk of aspiration due to decreased fluid intake or increased post-swallow oral and pharyngeal residues [14, 22, 36, 50, 96, 102]. Hence, it has been proposed as a strong consensus that it can be used as a second-line modality, not as a first-line. In two articles published after this study was completed [103, 104], they reported that new thickeners (mainly based on xanthan gum) are amylase resistant, stable over time and more palatable compare to the classical thickeners based on starch.

In addition, this products do not leave pharyngeal residue and strongly increase safety of swallow.

There are many types of thickening agents and their effect can be very different according to their rheological properties (shear thinning, amylase resistance, palatability, etc.). Therefore, we think that this recommendation may be open to change.

Recommendation 1c2b: Other exercises-Oropharyngeal strengthening, chin tuck against resistance (CTAR) exercise, breathing exercises (inspiratuar) and expiratory muscle strengthening exercises (EMST) can be effective in dysphagia (AC).

Recommendation 1c2b1. They can be considered as the second-line modalities (AC).

The muscles are one of the important structures of swallowing function. Studies have reported that the muscles involved in the formation of the oropharyngeal swallowing phase are affected even in the early stages of stroke and atrophy can develop [5]. Resistance training is known to induce mechanical changes, such as muscle volume and strength, by loading on target muscles [105, 106]. Strengthening exercises of muscles involved in swallowing function in the head and neck areas, especially strengthening of the tongue muscles provides bolus formation and control of the bolus, as well as decreases aspiration [107–109]. Shaker head lift which is a combination of isometric and isokinetic strengthening exercises, effective in increasing muscle strength and in decreasing aspiration as well as it has been strongly recommended [14, 34, 97, 110–112]. However, there is no standardization and it has been reported that it causes increased effort in healthy elderly people and increased symptoms such as neck pain as well as high drop out rates [110]. Since it can be considered difficult to apply in stroke patients, it has been recommended as a second-line treatment at a weak-level recommendation.

Chin tuck against resistance (CTAR) exercise, which has been developed in recent years due to the difficulty of applying shaker exercises, is the exercises strengthen the suprahyoid muscles in the sitting position [113]. It has been reported that it provides a significant improvement in the pharyngeal phase and reduces aspiration in stroke patients [107, 114–116]. However, this exercise has different modifications and application heterogeneity [106, 115–117].

Respiration after swallowing is usually followed by expiration, which could be an airway protective mechanism, as expiration can prevent the inhalation of residual material left in the pharynx after swallowing. That mean's is respiration and swallowing actions are highly coordinated. Moreover, weakness in the respiratory muscles, low thorax expansion, and postural trunk dysfunction occur after stroke [118–120]. Strengthening both the inspiratory and expiratory muscles in stroke patients can improve respiratory functions [118, 121–123]. In recent years, EMST related to the strengthening of the expiratory muscles has been mentioned. The mechanism of EMST is to increase the physiological load and to strengthen the expiratory and suprahyoid muscles [59]. It has been reported that EMST can improve swallowing dysfunction in dysphagia with different etiologies, and improves aspiration and penetration in patients with subacute stroke [124]. However, the level of evidence has been reported at the level of "expert opinion" [14]. Our experts have accepted that both general breathing exercises and EMST are effective in the treatment of dysphagia and can be used as a second-line treatment method. The recommendation level is weak as it requires an additional device.

None of these exercises mentioned above have standardization of their features such as frequency, intensity, repetition, and duration [117]. This situation prevents exercise therapy to have the value it deserves and shows that standardization studies are needed.

Recommendation 1c2c: Maneuvers are effective methods in dysphagia rehabilitation (e.g., Mendelson and Masako) (OC).

Recommendation 1c2c1: Maneuvers should be used as the second-line modalities (OC).

Swallowing maneuvers are behavioral interventions to improve swallowing function and to facilitate a safe and functional swallow. Maneuvers are compensatory techniques that are effective immediately [48]. Swallowing effort, Masako and Mendelson maneuvers are studied in the treatment of patients with dysphagia and recommended in therapy combinations [125–127]. It was noted that there was insufficient evidence about the effectivity, and there were difficulties in the application and adaptability of patients [14, 59, 89]. Since many systems are affected in stroke patients and mild to severe cognitive deficits occur, implementation difficulties may occur. However, in cases where there is no response to the first-line methods, it can be considered as the second-line method.

Recommendation 1c2d: Electrical stimulation (oral sensory and motor electrical stimulation) therapy is not an effective method in dysphagia rehabilitation (OD).

Recommendation 1c2d1: Electrical stimulation therapies can be considered as the second-line modalities (AC).

Electrical stimulation in dysphagia treatment is based on restoration, compensation, and adaptation mechanisms in brain. All electrical stimulation treatment target a role in the partial/complete recovery of impaired muscle function involved in the act of swallowing as well as in the functional recovery of the affected hemisphere by restoration mechanism, provided that reorganization occurs as a result of stimulation of the central swallowing centers in the unaffected hemisphere by compensation mechanisms. It is frequently included in combination therapies [12, 23, 48, 128–133]. Electrical stimulation often applies to palatal, anterior plicas, pharynx, supra-infrahyoid muscles and

masticatory muscles. Studies have been reported that it is effective at the level where active swallowing and motor motion occur and it is less effective in passive application and sensory stimulation level [105, 129]. In meta-analysis involving the effectiveness of NMES, it has been reported that it has a moderate effect on swallowing physiology and nutritional status in short-term combination therapy, and there is insufficient evidence to demonstrate its effect alone [130]. Moreover, there is no standardization in application features such as application location and frequency. In this study, there was a consensus that it was not effective alone. Despite this, it is stated that it can be used as a second-line treatment method especially in combination treatments as a weak recommendation.

1d. Third-Line Modalities

Recommendation 1d1: Other electrical stimulation (motor pharyngeal, transcranial direct current and transcranial repetitive magnetic electrical stimulations) therapies are not an effective method in dysphagia rehabilitation (OD).

Recommendation 1d1a: These electrical stimulation therapies can be considered as third-line modalities (AC)

Motor pharyngeal and transcranial electrical stimulations are methods of stimulation of the cortical regions to increase nerve function through reorganization, synaptogenesis, and neuroplasticity. In addition to transcranial stimulation applied directly to the head, there are applications that affect the indirect cortical region by applying to the pharyngeal region. It is effective on dysphagia in stroke patients, but it is controversial due to the heterogeneity of studies [14, 23, 61, 134–137]. In randomized controlled trials that have been evaluated in a review published in 2018 [89, 138–140] and in some high-quality studies, they were reported that repetitive magnetic stimulation may have had beneficial effect on dysphagia apart from other electrical stimulations. In our study, it is stated that these methods can be considered as a third-line treatment at the level of weak recommendation. We think that the reason for this is that magnetic stimulation is applied in a limited number of centers in our country due to the need for expensive equipment and expert personnel. Since this paper also reflects the opinions of our experts based on their clinical experience, the effectiveness of transcranial magnetic stimulation may not have been observed sufficiently. Therefore, we can say that this recommendation including transcranial magnetic stimulation method is unique to our country.

Recommendation 1d2: Biofeedback is not an effective method in dysphagia rehabilitation (OD).

Recommendation 1d2a: Biofeedback can be considered as the third-line modality (AC).

Biofeedback that focused on training the ability to provide timing and coordination of swallowing can be used to aid in muscle relaxation, coordination, and/or muscle response pattern training, as well as increased recruitment of motor units during muscular activity [131, 141]. Its effect is related to the performance of cortical functions and attention level, so it may not be suitable for all patients. When considered in combination treatments, it is an effective and promising treatment [25, 63, 64]. It is suggested to be used as a third-line treatment method.

1e. Other Modalities

Recommendation 1e1: Acupuncture is not an effective method in dysphagia rehabilitation (OD).

Recommendation 1e1a: Acupuncture cannot be a third-line modality (OD).

Acupunture which spreads from China to all over the world has many studies in stroke patients [142–150]. It has been reported that acupuncture may play effective roles in neuroprotective, microcirculatory, and metabolic recovery, which may accelerate the recovery of brain function in the early stage of stroke. Moreover, it has a short-term effect on swallowing functions in patients with dysphagia and can be added to traditional treatments [23, 61, 89, 142–150]. However, in these studies, a standard punctuation area is not mentioned, and there are different applications in each of them. Our experts reported that acupuncture alone is not effective and is still a method that can be used in experimental and research fields.

Recommendation 1e2: Kinesiotaping is not an effective method in dysphagia rehabilitation (OD).

Recommendation 1e2a: Kinesiotaping cannot be a third-line modality (OD).

Kinesiotaping is widely used in the prevention and treatment of sports injuries and joint diseases [151–153]. It has been reported that it has effects on pain, proprioception, and ROM with increasing blood circulation and lymph absorption as well as providing joint fixation [154]. Studies reported that it may be an alternative treatment to reduce drooling and saliva control in children with neurological disease [155, 156]. There are few studies in patients with stroke. It has shown that kinesiotaping can improve laryngeal elevation by supporting the suprahyoid muscles during application [157]. However, the quality of studies is low and there is no standardization. This recommendation article emphasized that kinesiotaping application is not effective for dysphagia in stroke patients and that large-scale and high-quality studies are needed.

Recommendation 1e3: Massage and mobilization are not effective methods in dysphagia rehabilitation (OD).

Recommendation 1e3a: Massage and mobilization cannot be third-line modalities (OD).

Manual therapy usually represents a wide range of techniques, including passive and active stretching, light and

deep soft tissue mobilization, and joint manipulation. These techniques are used to increase tissue and muscle extensibility, promote a joint range of motion, and reduce pain and inflammation [158, 159]. Although it has been reported that it supports dysphagia treatment in non-stroke patients [160], it is thought that it does not have a place in dysphagia treatment because of the lack of adequate studies in stroke patients, high side effect, and need the experienced trained people.

Recommendation 1e4: Drug therapy is not an effective method in dysphagia rehabilitation (OD).

Recommendation 1e4a: Drug therapy cannot be a third-line modality (OD).

In the treatment of dysphagia, drugs are often used to stimulate swallowing function via the peripheral and/or central nervous system. It has been reported that capsaicin and dopaminergic agents trigger the swallowing reflex, and angiotensin converting enzyme inhibitors (ACE) are effective in swallowing due to the dry cough side effect [161]. Also, the nifedipine acts on pharyngeal transition time, and metoclopramide, erythromycin, and cisapride are effective on gastric motility. Studies have reported that drug therapy can be tried as an aid to other methods [10, 14, 23]. During the study, ACE inhibitors were defined by 2 experts as drugs that can be used in dysphagia management, but were not accepted by other experts at the recommendation level. In this paper, it is concluded that drugs have no place in the treatment of dysphagia.

Recommendation 1e5: Psychological support is not an effective method in dysphagia rehabilitation (OD).

Recommendation 1e5a. Psychological support cannot be a third-line modality (OD).

Dysphagia causes both medical and psychosocial consequences. Moreover, it has been stated that rehabilitation methods such as bolus and nutritional modifications in dysphagia treatment may affect the psychological state of the patient [66, 71, 96]. It was stated that the mood of the patient should be questioned especially before the enteral gastrostomy tube application [13]. In a meta-analysis, it has been reported that compressive approaches, especially including psychological support, will increase the effectiveness of treatment [66, 162]. In this study, psychological support is still considered as a method that should be investigated.

Limitation

The most important limitation of this study is that these consensus-based recommendations are created only by experience and expertise of medical specialists in various disciplines. These views prioritize the methods that can be reached and applied in clinical practice by any medical specialist, in any city, in any hospital, although there is no bias. The reason for this is that it may be due to the inability of the experts participating in the study to access methods that require special training, devices, and equipment such as acupuncture and transcranial magnetic stimulation used in dysphagia rehabilitation. Therefore, we can say that most of the suggestions are specific to our country. Despite this limitation, we believe that these detailed and algorithmic recommendations which can be applied anywhere in clinic practice and created for the first time in the world will contribute to dysphagia rehabilitation.

Conclusion

While there is a consensus in the concept of the multidisciplinary team and early diagnosis in dysphagia management in the world, there are different voices in subjects such as diagnosis and treatment. This study aimed to find answers to the most frequently asked questions in clinical practice for all management steps of dysphagia by a multidisciplinary team that looks at dysphagia from different perspectives for the same purpose. As a result, all the issues were handled in detail and 72 rehabilitation recommendations were created for stroke patients with dysphagia.

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no individual conflict of interest according to the rules of the International Committee of Medical Journal Editors (ICMJE).

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee (IRC:2018.03.47/19) and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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